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A REVIEW OF SPECIES OF THE FAMILY SCYPHACIDAE IN THE NEW WORLD (CRUSTACEA, ISOPODA, ONISCOIDEA)

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Species of the family Scyphacidae (= Scyphacinae of the family Oniscidae of Vandel, 1962, p. 465) occupy beach niches on the sea coasts of the world. Eight species representing four genera are recorded from the New World. The genus *Deto* Guérin is represented by two species in southern South America. The genus *Armadilloniscus* Uljanin contains four species in North America. One species is present on the east coast and in Bermuda, and three are present on the west coast. The two other genera are represented by a single species each in the New World. *Scyphacella arenicola* Smith (1873), a monotypic genus, has been recorded from Woods Hole, Massachusetts, south to Miami, Florida. *Detonella papillicornis* (Richardson, 1904) inhabits the coast from the western Aleutians south to Friday Harbor, Washington (Hatch, 1947). *Detonella* Lohmander contains a second species from a latitude in Asia comparable to that of southern Alaska (Sakhalin Island—Verhoeff, 1942). For the most part species of Scyphacidae are recorded from the Southern Hemisphere. The two genera at present not represented in the New World are *Scyphax* and *Scyphoniscus*. Specimens of the members of the family in both the National Museum of Natural History, Smithsonian Institution and the American Museum of Natural History were examined. More New World species probably will be discovered when the beach niches of the West Indies and of South America are more thoroughly explored.

Species of the family have four flagellar articles on the

flagellum of antenna 2. Verhoeff (1942) stated that there are seven articles in *Detonella sachalina*, but this seems unlikely since Richardson (1904) made a similar error when she observed the flagellum of *D. papillicornis* (she observed "about seven articles"). On the basis of her observation she placed the species in Trichoniscidae. Lohmander (1927—through C. R. Shoemaker, footnote p. 17) determined that there were four or five articles, and placed the species in a new genus, *Detonella*, in the Scyphacidae. The author examined the type-specimen (USNM 28772) and saw only four articles. After about 64 years clearing in alcohol and with an improved microscope, the articulations were distinct and four articles unquestionably are present.

Vandel (1962, p. 466) records the principal characters of members of the family. He considers it to be a subfamily of the Oniscidae. Vandel (1968, p. 54 and elsewhere) places the genus *Alloniscus* Dana (1856) in the subfamily Scyphacinae. The members of *Alloniscus* including the type-species have three distinct flagellar articles on antenna 2 and are closer related to species of Oniscinae or perhaps Philosciinae of the Oniscidae rather than to the Scyphacidae. The author has examined the type-species *Alloniscus perconvexus* Dana (1856) in light of the widely misused genus name *Alloniscus*, and his study will be the subject of another paper. The author considers the Scyphacidae to be a distinct family defined in part on the presence of four flagellar articles on the flagellum of antenna 2 as did Chilton (1901), Van Name (1936), Arcangeli (1957) and Green (1961) among others.

The species of the family Scyphacidae are defined as follows (modified from Vandel, 1962, p. 466): 1. Four flagellar articles on the flagellum of antenna 2. 2. Cephalon primitive in structure with (almost always) a supra-antennal line. 3. Maxilliped with four palp articles and endite, or with five defined articles. 4. Dactyl organ present on peraeopods (except in *Scyphax*). 5. Male genital apophysis and endopod of pleopod 1 primitive.

Citations and synonyms later than those included by Van Name (1936) are recorded for all New World species of the family. The geographic distribution of each species is re-

corded. Menzies (1950) reviewed and illustrated three species of *Armadilloniscus* from the west coast of North America. Arcangeli (1957) reviewed the *Armadilloniscus* species including those from Europe, North America and the islands in between. Vandel (1962) described in detail the species from France. Schultz (1972) briefly described and illustrated the common species of *Armadilloniscus* from Bermuda and the east coast—*A. ellipticus* (Harger).

Scyphacella arenicola Smith (1873)
Figures 1–28

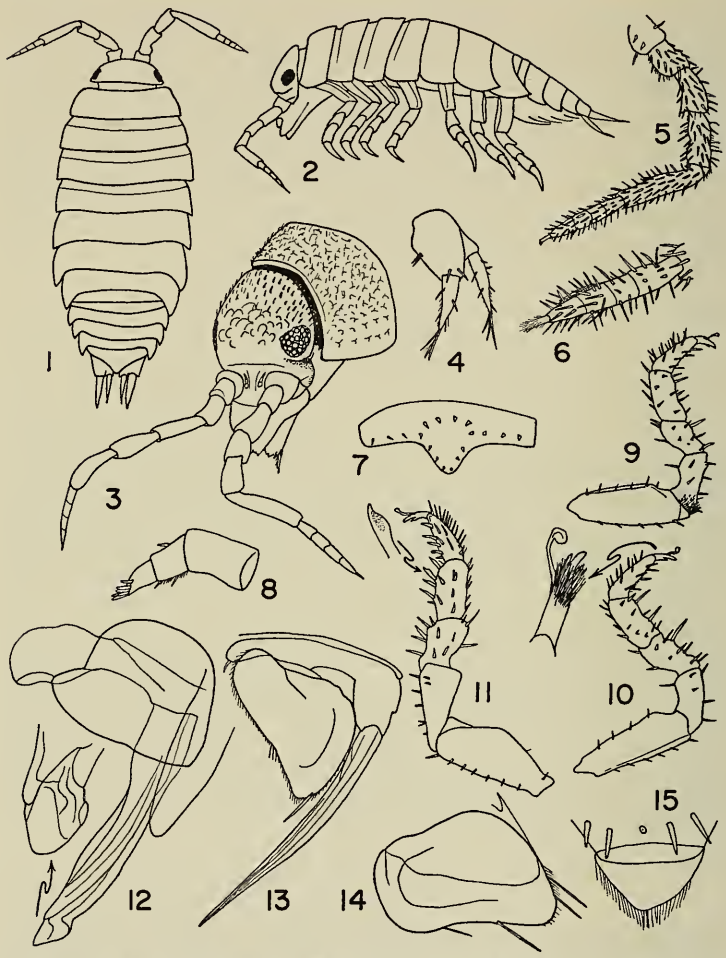
Scyphacella arenicola Smith, 1873.—Van Name, 1936, p. 96, fig. 41.

In spite of the number of records of the species from the east coast of the United States, the species has never been properly illustrated. The range is recorded as from Woods Hole, Massachusetts (USNM 25088; AMNH 1892, 1893) south to Miami, Florida (USNM 42585—E. B. Thomas coll.). The specimens from Miami were collected before 1918 (as inferred by the accession number). They perhaps represent the former distribution of the species since it has never been recorded from Miami or other Florida locations since. The author (1964) spent much time studying the terrestrial isopods of the coast of North Carolina and never encountered the species on the extensive beaches and marshy places near Beaufort in that state. The National Museum of Natural History has many specimens from Cleoptauk River, Maryland (USNM 33059) and nearby Norfolk, Virginia (USNM 35934). The specimen dissected and drawn here is a male 3.4 mm long from Norfolk. It was the longest male in the collection. The largest female was 4.4 mm long from Cleoptauk River. No females were gravid.

Detonella papillicornis (Richardson, 1904)
Figure 29

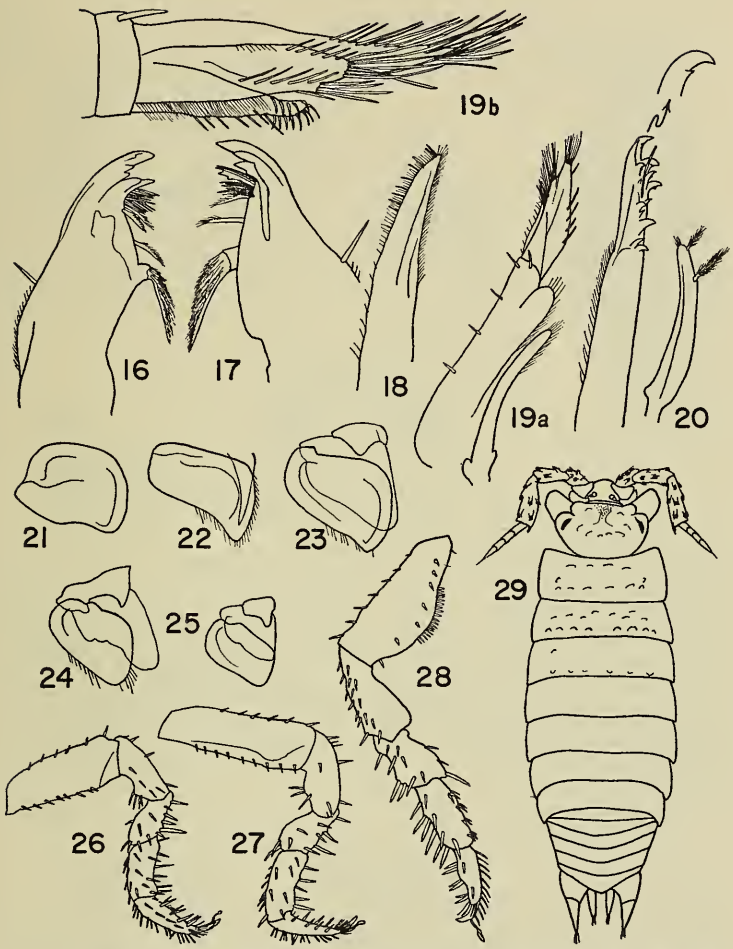
Detonella papillicornis (Richardson, 1904).—Van Name, 1936, p. 100, fig. 44.—Verhoeff, 1942, p. 171.—Hatch, 1947, p. 191, figs. 41, 144–148, 172.
Detonella lohmanderi Verhoeff, 1942, p. 171.

The appendages including mouth parts of the species are described in detail by Lohmander (1927) who removed the species from *Trichoniscus* and put it in a new genus. Lohmander did not, however, illustrate the whole animal. The type-specimen, a male 3.8 mm long (USNM 28772), is illustrated here. There are small, but conspicuous tubercles on the cephalon and on the anteriormost peraeonal segments. The anterolateral lobes are larger than those illustrated by Richardson (1904) and the eyes are on conspicuous bumps arising from the cephalon



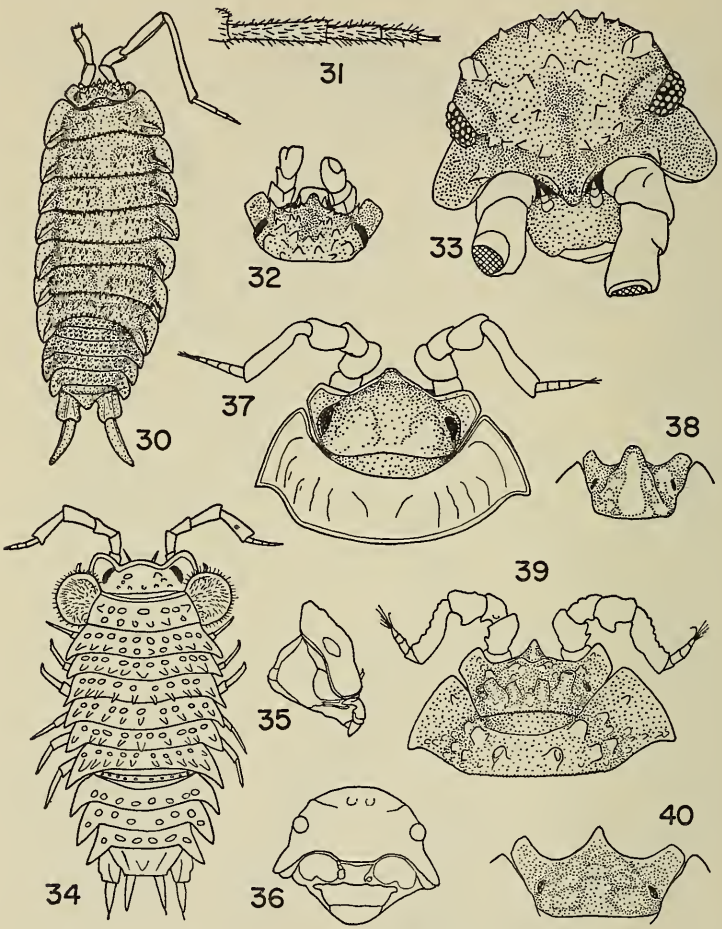
FIGS. 1–15. *Scyphacella arenicola* Smith, male 3.4 mm long. 1. dorsal view. 2. lateral view. 3. oblique view cephalon. 4. uropod. 5. antenna 2. 6. flagellum antenna 2. 7. pleotelson. 8. antenna 1. 9–11. peraeopods I, II and VII respectively. 12–14. pleopods 1–3 respectively. 15. clypeus.

proper. Richardson shows the anterior margin notched, but close inspection by the author showed that the notch was not quite in the center. It appears to be damage, not a natural notch. Lohmander recorded the cephalon "with triangularly produced, broadly rounded medial lobe" on the frontal margin. The buccal mass extends a considerable



FIGS. 16–28. *Scyphacella arenicola*, male and female. 16. left mandible. 17. right mandible. 18. maxilla 1. 19a. maxilliped (whole). 19b. maxilliped (detail apex). 20. maxilla 2. 21–25. pleopods female 1–5 respectively. 26–28. peraeopods female I, II and VII respectively. Fig. 29. *Detonella papillicornis*, male 3.8 mm long (type-specimen).

distance beyond the frontal margin of the cephalon as in *Scyphacella arenicola* (cf. figs. 3 and 29). As noted before there are four articles on the flagellum of antenna 2. The species has been recorded as an inhabitant of beaches from Bering Island (Ostrov Bering), Russia, along the Aleutian Islands to Cook Inlet south to Puget Sound, Washington



Figs. 30–33. *Deto marina* female 14 mm (from S. Australia). 30. dorsal view. 31. flagellum antenna 2. 32. dorsal view cephalon. 33. facial view cephalon. Figs. 34–36. *Deto bucculenta.* 34. dorsal view (after Nicolet). 35. lateral view cephalon (after Jackson). 36. facial view cephalon (after Jackson). Figs. 37–40. *Armadilloniscus* species. 37. *A. ellipticus* cephalon. 38. *A. lindahli* cephalon. 39. *A. coronacapitalis* cephalon. 40. *A. holmesi* cephalon.

(Hatch, 1947, p. 191). When enough specimens are collected of Verhoeff's species *Detonella sachalina* from Sakahlin Island, they should be compared to bring out the differences of the two species or prove the synonymy of the species (Unfortunately specimens in the National

Museum of Natural History labeled *Detonella sachalina* Verhoeff, 1942, are of a *Trichorhina*—two distinct flagellar articles, subtropical tropical distribution—and are probably the result of someone's mistake.)

Deto bucculenta (Nicolet, 1849)
Figures 34–36

Deto bucculenta (Nicolet, 1849).—Van Name, 1936, p. 98, fig. 42.

Van Name (1936) included a discussion of the species. It was collected in Chile at the Bay of Valparaiso, and has not been cited since 1936 from the New World. Hurley (1950, p. 121, pl. 1, fig. 2) illustrates what he calls *Deto bucculenta* from New Zealand.

Deto marina (Chilton, 1884)
Figures 30–33

Deto marina (Chilton, 1884).—Ringuelet, 1955, p. 438.—Vandel, 1952, p. 18.

Trichoniscus magellanicus Dana.—Stebbing, 1900, p. 566.—Van Name, 1936, p. 82.—Vandel, 1952, p. 18.

The species is most abundant in New Zealand and southern Australia. Ringuelet (1955) noted its presence on Islas Malvinas (Falkland Islands) as cited by Stebbing (1900). Vandel (1952, p. 18) stated that Stebbings record was really a record of *Deto marina.* No specimens of *D. marina* from South America were seen, but Green (1961, p. 294, figs. 73 and 74) illustrated and described key characters of the species. The specimens illustrated here are from the upper beach at Willunga, South Australia. They were collected from under rocks in seaweed, and perhaps specimens of *D. marina* will be found in similar habitats in southern South America.

Armadilloniscus ellipticus (Harger, 1878)
Figure 37

Armadilloniscus ellipticus (Harger, 1878).—Van Name, 1936, p. 102, fig. 45.—Menzies, 1950, p. 467.—Arcangeli, 1957, p. 423.—Vandel, 1962, p. 471.—Schultz, 1963, p. 26; 1966, p. 457; 1972, p. —, fig. 4I-P.

The species recently has been illustrated by Schultz (1971) using specimens from Bermuda. The specimens from Bermuda have more noticeable tubercles on the cephalon than those from North Carolina illustrated here. Unfortunately a series of specimens for comparison are not available so that subspecies if present can be revealed. The species is common on well-drained sand beaches in the maritime drift or under any flat cover such as a board, flat rock or box which has been on the beach for a long time. Frequently the habitat is covered with water at high tide. The species has been recorded from Woods Hole, Massa-

chusetts, south to Miami, Florida (Schultz, 1966). The National Museum of Natural History has many specimens from Virginia.

Armadilloniscus lindahli (Richardson, 1905)
Figure 38

Actoniscus lindahli Richardson, 1905.—Miller, 1938, p. 114.
Armadilloniscus lindahli (Richardson).—Van Name, 1936, p. 104, fig. 47.—Menzies, 1950, p. 469, pl. 26, figs. 17–26.—Arcangeli, 1957, p. 424.—Schultz, 1970, p. 130.
Scleropactes cedrosensis Mulaik, 1960, p. 181, pl. 17, figs. 342–346.—Schultz, 1970, p. 130.

The species has been found on the beach from Tomales Bay, central California, to Isla Cedros, Baja California. The species is unique among west coast species because it is capable of rolling into a ball like a pillbug.

Armadilloniscus holmesi Arcangeli (1933)
Figure 40

Actoniscus tuberculatus Holmes and Gay, 1909.—Miller, 1938, p. 114.
Armadilloniscus tuberculatus (Holmes and Gay).—Van Name, 1936, p. 103, fig. 46; 1940, p. 132.—Hatch, 1947, p. 192, fig. 153.—Vandel, 1962, p. 471.
Armadilloniscus holmesi Arcangeli, 1933, p. 59; 1957, p. 424.—Van Name, 1940, p. 132.—Menzies, 1950, p. 470, pl. 27, figs. 27–36.—Mulaik, 1960, p. 135, pl. 6, figs. 93–105.

The species was described originally as *tuberculatus* (Holmes and Gay, 1909), but the name was found to be preoccupied by Arcangeli (1933). The species lives on the seashore from Friday Harbor to Bahía Magdalena, Baja California.

Armadilloniscus coronacapitalis Menzies (1950)
Figure 39

Armadilloniscus coronacapitalis Menzies, 1950, p. 468, pls. 23–25, figs. 1–16.—Arcangeli, 1957, p. 425.

The species was collected from under rocks at the high tide line on the beach at Tomales Bay, central California. Menzies (1950) described and illustrated the large tubercles on the cephalon which serve to distinguish the species from other California species of the genus.

A Key to the Species of New World Scyphacidae

1a. Uropodal bases flattened and expanded with rami extending to or slightly beyond body margin 2
1b. Uropodal bases not expanded; rami extending well beyond body margin 5

2a. Eyes moderately large (10 or more ocelli); dorsal ornamentation of peraeon consists of elongate tubercles arranged in longitudinal rows ..... *Armadilloniscus ellipticus*
2b. Eyes small (7 or less ocelli); dorsal ornamentation various 3
3a. Rostrum broad or truncate; capable of rolling into ball ..... *Armadilloniscus lindahli*
3b. Rostrum pointed; not capable of rolling into ball 4
4a. Dorsum of cephalon with large tubercles; dorsum of peraeon with at least two conspicuous longitudinally arranged rows of tubercles ..... *Armadilloniscus coronacapitalis*
4b. Dorsum of cephalon with only small rounded tubercles; dorsum of peraeon relatively smooth ..... *Armadilloniscus holmesi*
5a. Anterolateral processes of cephalon large and angular (very conspicuous in dorsal view) 6
5b. Anterolateral processes of cephalon small and inconspicuous in dorsal view ..... *Scyphacella arenicola*
6a. Peraeonal segment I expanded laterally ..... *Deto bucculenta*
6b. Peraeonal segment I not expanded laterally 7
7a. Dorsum of cephalon and peraeon covered with short spines ..... *Deto marina*
7b. Dorsum of cephalon and peraeon relatively smooth, never covered with spines ..... *Detonella papillicornis*

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